ARMY RDT&E BUDGET ITEM JUSTIFICATION (R-2 Exhibit)

DATE: February 2000

BUDGET ACTIVITY: 3 - Advanced Technology Development

PE NUMBER AND TITLE: 0603313A Missile and Rocket Advanced Technology

COST (*In Thousands*)	FY1999 Actual	FY 2000 Estimate	FY 2001 Estimate	FY 2002 Estimate	FY 2003 Estimate	FY2004 Estimate	FY2005 Estimate	Cost to Complete	Total Cost
Total Program Element (PE) Cost	59366	51188	25107	24942	32489	53980	52447	0	299519
D206 Missile Simulation	2311	2755	2442	2780	3122	3622	3333	0	20365
D263 Future Missile Technology Integration (FMTI)	7055	19822	13371	9382	2452	18126	16713	0	86921
D380 Multi-Platform Launcher	5588	4365	0	0	0	0	0	0	9953
D486 Rapid Force Projection Simulation	4890	0	0	0	0	0	0	0	4890
D493 Rapid Force Projection Demonstration	16168	16949	0	0	0	0	0	0	33117
D496 Enhanced Fiber Optic Guided Missile (EFOG-M)	18630	0	0	0	0	0	0	0	18630
D549 2.75 Inch Anti-Air Technology Demonstration (TD)	2590	0	0	0	0	0	0	0	2590
D550 Counter Active Protection System	2134	1990	5466	5461	2481	0	0	0	17532
D567 Low Cost Precision Kill (LCPK) for 2.75 Inch Rockets	0	5307	3828	0	0	0	0	0	9135
D655 Hypervelocity Technology Demonstration (TD)	0	0	0	7319	24434	24354	24300	0	80407
D704 Advanced Missile Demonstrations	0	0	0	0	0	7878	8101	0	15979

A. Mission Description and Budget Item Justification: This program element demonstrates application of mature advanced missile technologies to enhance U. S. Army force structure capabilities and existing assets. Major objectives for investigation are system deployability, lethality, survivability, flexibility and affordability. Work in this program element addresses the full spectrum of missile tactical missile roles and missions and is focused on upgrades to current missile systems. Efforts are conducted through system simulation/virtual prototyping, system design, hardware development and test, and demonstration in laboratory and operational scenarios. This program element provides for the demonstration of advanced tactical missile enhancements and includes real-time hardware-in-the-loop simulation technology, multi-role fire-and-forget seeker technologies capable of locating targets in clutter, lightweight launcher improvements and enhanced rocket accuracy, advanced technologies for missile guidance, missile warheads, and hypervelocity missile technologies.

ARMY RDT&E BUDGET ITEM JUSTIFICATION (R-2 Exhibit)	DATE February 2000
BUDGET ACTIVITY **3 - Advanced Technology Development**	PE NUMBER AND TITLE **0603313A Missile and Rocket Advanced Technology**

The work in this program element is consistent with the Army Science and Technology Master Plan, the Army Modernization Plan, Project Reliance, and supports multiple Defense Technology Objectives. This program element supports the U.S. Army Training and Doctrine Command (TRADOC) Battle Labs. Work in this program element is related to and fully coordinated with efforts in PE 0601104A (University and Industry Research Centers), PE 0602303A (Missile Technology), PE 0603238A (Air Defense/Precision Strike Technology), and PE 0603363F in accordance with the ongoing Reliance joint planning process and contains no unwarranted duplication of effort among the Military Departments.

B. Program Change Summary	FY 1999	FY 2000	FY 2001
Previous President's Budget (FY 2000/2001 PB)	71394	43639	24011
Appropriated Value	71896	51639	
Adjustments to Appropriated Value			
a. Congressional General Reductions	-502		
b. SBIR / STTR	-1715		
c. Omnibus or Other Above Threshold Reductions		-195	
d. Below Threshold Reprogramming	-10313		
e. Rescissions		-256	
Adjustments to Budget Years Since (FY 2000/2001 PB)			+1035
New Army Transformation Adjustment			+61
Current Budget Submit (FY 2001PB)	59366	51188	25107

Change Summary Explanation: Funding - FY 1999: Project D493 Rapid Force Projection Demonstration was adjusted (-10313) for higher Army priorities.

FY 2001: Project D206 Missile Simulation was adjusted (-397) to reflect the new Army Vision/Transformation.

Project D263 Future Missile Technology Integration (FMTI) was adjusted (+6990) to reflect the new Army Vision/Transformation.

Project D380 Multiple Launch Rocket System Smart Tactical Rocket (MSTAR) was adjusted (-6532) to reflect the new Army Vision/Transformation.

ARMY RDT&E BUDGET ITEM JUSTIFICATION (R-2A Exhibit)

DATE: February 2000

BUDGET ACTIVITY: 3 - Advanced Technology Development

PE NUMBER AND TITLE: 0603313A Missile and Rocket Advanced Technology

PROJECT: D206

COST (*In Thousands*)	FY1999 Actual	FY 2000 Estimate	FY 2001 Estimate	FY 2002 Estimate	FY 2003 Estimate	FY2004 Estimate	FY2005 Estimate	Cost to Complete	Total Cost
D206 Missile Simulation	2311	2755	2442	2780	3122	3622	3333	0	20365

Mission Description and Justification: This project supports three separate, but related, tasks: (a) development, expansion, and improvement of hardware-in-the-loop (HWIL) simulation capabilities applicable to the evaluation of tactical missiles guided by signals in radio frequency (RF), millimeter wave (MMW), electro-optical (EO), and infrared (IR) electromagnetic spectral regions (b) Distributed Interactive Simulation (DIS) via a node to the Defense Advanced Research Projects Agency (DARPA) Defense Simulation Internet; and (c) battlefield distributed simulation, which provides an all-analytical simulation of a weapon system engaging multiple targets in a simulated battlefield environment, including the effects of natural and battle-caused obscurants and disturbances. Evaluation by means of HWIL provides cost effective support to missile development throughout weapon system life cycles and permits a reduction in the number of flight tests actually performed. Work is performed by the Aviation and Missile Research, Development, and Engineering Center, U.S. Army Aviation and Missile Command (AMCOM), Redstone Arsenal, AL. Major contractors are Boeing Defense and Space Group, Seattle, WA; and Nichols Research Corporation, Huntsville, AL.

FY 1999 Accomplishments:

- 1493 - Completed development of the first stage of a computer-controlled precision signal measurement instrument (target verification monitor) for microwave and MMW radar HWIL simulation capabilities (currently supporting LONGBOW missile and PAC-3)
  - Integrated dichroic beam combiner, IR scene projection, and MMW signal generation technology for support of dual-spectrum (MMW/IR) HWIL simulation into a dual-spectrum HWIL simulation capability (applicable to Brilliant Anti-Tank Preplanned Product Improvement (BAT P3I) , Sense and Destroy Armor (SADARM), and Medium Extended Air Defense System (MEADS)).
  - Implemented improvements to the temporal and spatial non-uniformity correction scheme for the IR laser diode array projector (LDAP) with a consequent improvement in overall projector performance (supporting Theater High Altitude Air Defense (THAAD), BAT P3I, FMTI).
  - Investigated application of spatial light modulators to IR scene projector technology as an alternative to LDAP and resistive element integrated circuit arrays with the objective of devising "leap ahead" IR scene projector technology.
  - Improvements were completed to realtime dynamic IR scene generator software (benefits THAAD, BAT P3I, FMTI)
- 818 - Achieved modernization of the Electro-Optical Simulation System for support of Enhanced Fiber Optic Guided Missile (EFOG-M) and FMTI.
  - Implemented Upgrades to the AMCOM Distributed Simulation Center (DSC) realtime processing, data display and virtual prototype simulator and planned HLA compliance.
  - Upgraded battlefield test bed capabilities to support DSC exercises with integrated live, virtual and constructive forces. Commenced conversion to HLA compliance.

Total 2311

ARMY RDT&E BUDGET ITEM JUSTIFICATION (R-2A Exhibit)	DATE February 2000
BUDGET ACTIVITY 3 - Advanced Technology Development	PE NUMBER AND TITLE 0603313A Missile and Rocket Advanced Technology PROJECT D206

FY 2000 Planned Program:

•	2008	- Extend technology for dual-spectrum (passive IR, active MMW) simulation capability to support HWIL simulation of air and missile defense interceptor kill vehicles (applicable to MEADS and Atmospheric Interceptor Technology (AIT)). - Initiate technology investigations for tri-mode HWIL simulation to support Modernized HELLFIRE development. - Integrate HWIL capabilities for simulation of passive IR guided missile seekers and onboard tracking, guidance, and navigation processors with system ground equipment and test and evaluation physical environment conditioning simulators to apply and extend the principles of Simulation Based Acquisition to end-to-end missile system simulations (applicable to THAAD, National Missile Defense (NMD), AIT, and Anti-Satellite (ASAT)). - Integrate resistive element integrated circuits for IR scene projection with drive electronics and non-uniformity correction hardware/software (applicable to all IR missile seeker simulations). Implement into HWIL simulation capabilities. - Implement improvements to MMW signal generation to support high-speed digital processing of intermediate frequency signals in the digital domain for radio frequency guided missiles and submunitions. - Investigate means of implementing a HWIL simulation capability for active IR and laser detection and ranging (LADAR) guidance systems. - Develop a flight table-mountable laser diode array projector (LDAP) IR scene projector to eliminate requirements for synthetic line-of-sight representation of missile-target relative motion in HWIL simulations (applicable to all IR guided missiles and submunitions).
•	677	- Extend battlefield test bed and Distributed Simulation Center capabilities to support Simulation Based Acquisition principles and investigate future battle-fighting techniques via live, constructive, and virtual simulations. - Upgrade software tools and virtual prototype applications to HLA compliance. Improve realtime computer-generated forces to support R&D requirements. - Implement improvements in the synthetic battlefield environmental effects capability to represent actual conditions with greater realism.
•	70	- Small Business Innovation Research/Small Business Technology Transfer (SBIR/STTR) Program
Total	2755	

FY 2001 Planned Program:

•	1820	- Complete the development of a dual-spectrum (passive IR, active MMW) simulation capability to support HWIL simulation of air and missile defense interceptor kill vehicles (applicable to MEADS and Atmospheric Interceptor Technology (AIT)). - Continue technology development of Modernized HELLFIRE HWIL simulation, including trichroic beam combiner, semiactive laser mode, and MMW signal radiation. - Continue the development of HWIL capabilities for simulation of passive IR (and dual spectrum) guided missile seekers and onboard tracking, guidance, and navigation processors with system ground equipment and test and evaluation physical environment conditioning simulators for end-to-end missile system HWIL simulations (applicable to THAAD, NMD, AIT, and ASAT). - Develop technology components applicable to implementation of a HWIL simulation capability for active IR (LADAR) guidance systems.

ARMY RDT&E BUDGET ITEM JUSTIFICATION (R-2A Exhibit)	DATE February 2000
BUDGET ACTIVITY 3 - Advanced Technology Development	PE NUMBER AND TITLE 0603313A Missile and Rocket Advanced Technology PROJECT D206

FY 2001 Planned Program: (continued)

		- Demonstrate a flight table-mountable LDAP IR scene projector to eliminate requirements for synthetic line-of-sight representation of missile-target relative motion in HWIL simulations (applicable to all IR guided missiles and submunitions). - Investigate and apply techniques for extending digital signal processing to signal generation of MMW radio frequency (RF) signals to improve HWIL simulator RF performance (bandwidth, sensitivity, low noise characteristics) to match or exceed developments in RF seeker technology.
•	622	- Further extend battlefield test bed and Distributed Simulation Center capabilities to support Simulation Based Acquisition principles and investigate future battle-fighting techniques via live, constructive, and virtual simulations. - Increase realism and fidelity of simulated dirty battlefield in virtual simulation applications to support refined weapon system design, development, and technology insertions. - Provide improved model fidelity for Army aviation and missile battlefield simulation applications to predict and evaluate weapon system performance with greater accuracy.
Total	2442	

ARMY RDT&E BUDGET ITEM JUSTIFICATION (R-2A Exhibit)

DATE: February 2000

BUDGET ACTIVITY: 3 - Advanced Technology Development

PE NUMBER AND TITLE: 0603313A Missile and Rocket Advanced Technology

PROJECT: D263

COST (*In Thousands*)	FY1999 Actual	FY 2000 Estimate	FY 2001 Estimate	FY 2002 Estimate	FY 2003 Estimate	FY2004 Estimate	FY2005 Estimate	Cost to Complete	Total Cost
D263 Future Missile Technology Integration (FMTI)	7055	19822	13371	9382	2452	18126	16713	0	86921

Mission Description and Justification: This project provides for the demonstration of advanced tactical missile technologies including seekers, propulsion, airframes, and guidance and control. The project will demonstrate lightweight multi-role missile technology in support of ground-to-ground, ground-to-air, air-to-air and air-to-ground missions. Combined flexible capability allows one system, or variants of one system, to replace many, realizing potential extensive savings in development costs, logistics, training, etc. Particular attention will be given to the development of IR seeker technology capable of long range lock, variable thrust propulsion allowing system range extension and thus stand off and high survivability, and the innovative use of radio frequency (RF) data links for identification friend or foe, and the attack of targets masked from the launch platform. The missile system demonstration includes the integration of guidance, control, propulsion, and airframe technologies capable of performing in high clutter/obscurants, adverse weather environments and under countermeasure conditions. Missile control and guidance system technology will explore capabilities such as lock-on before/lock-on after launch, fire and forget, command guidance, imaging IR signal and image processing, and wide band secure data links. The objective of the Modernized HELLFIRE Technology Effort is the demonstration and integration of dual or multi-mode seeker concepts, controllable thrust rocket motors (gels or pintle-controlled solids), automatic target recognition (ATR), and wide-band secure datalinks. Seeker technology will address imaging infrared, millimeter wave, and laser radar (LADAR) seeker technologies combined with the existing semi-active laser, in order to provide precision strike and fire-and-forget guidance modes without major modifications to the host platform. Affordable, controllable thrust rocket motors, such as gelled bipropellants or pintle-controlled solids, will be demonstrated to provide longer ranges and shorter flight times while increasing system robustness in the Air-to-Ground (ATG) and Ground-to-Ground (GTG) roles. ATR will be demonstrated permitting true fire-and-forget at targets beyond visual range. Finally, secure wide-band datalink hardware, allowing target position updates during missile flight, will be demonstrated. These efforts are a risk mitigation effort in support of a FY03 EMD start for Modernized HELLFIRE and are supported by the Air-to-Ground Missile System (AGMS) PM. This program will leverage technologies developed and demonstrated under the Future Missile Technology Integration (FMTI) program as well as the ongoing Defense Advanced Research Projects Agency (DARPA) Advanced Fire Support System (AFSS) program and will be executed in two phases: 1) the first phase will conduct detailed analysis of the above technologies for maturity, packaging, risk, and cost. 2) The second phase will design, fabricate, integrate and test a prototype Modernized Hellfire missile through live-fire demonstrations as part of the AFSS program. Work is performed by the Missile Research, Development, and Engineering Center, U.S. Army Aviation and Missile Command (AMCOM), Redstone Arsenal, AL. Major contractors are Raytheon Company, Electronic Systems, Tewksbury, MA; TRW Space Electronics Group, Redondo Beach, CA; Loral Communications Systems, Salt Lake City, UT; Raytheon Systems Company, Tucson, AZ; Alliant Techsystems, Hopkins, MN; Marconi Aerospace Defense Systems, Austin, TX; The Boeing Company, Duluth, GA; Northrop-Grumman Corporation, Baltimore, MD; and Lockheed Martin Vought Systems, Ft. Worth, TX.

ARMY RDT&E BUDGET ITEM JUSTIFICATION (R-2A Exhibit)	DATE February 2000
BUDGET ACTIVITY 3 - Advanced Technology Development	PE NUMBER AND TITLE 0603313A Missile and Rocket Advanced Technology
	PROJECT D263

FY 1999 Accomplishments:

•	1445	- Conducted detailed seeker trade studies to assess imaging IR, millimeter wave, and laser radar (LADAR) seeker technologies combined with the existing semi-active laser into dual-mode seeker that will fulfill Modernized HELLFIRE requirements. - Developed detailed program plan. - Evaluated seeker concepts for contract award.
•	5610	- Performed flight test of FMTI program missile including gel bipropellant propulsion system.
Total	7055	

FY 2000 Planned Program:

•	6076	- Downselect to best Modernized Hellfire (Mod HF)/ Advanced Fire Support System (AFSS) Air-to-Ground (ATG) and Ground-to-Ground (GTG) seeker concept(s) based on FY 99 seeker tradeoff studies. - Award contract(s) to design captive flight and missile flight seekers for integration on AFSS missiles.
•		- Identify alternative Mod HF/AFSS seeker which offers higher payoff and greater risk than selected primary seeker.
•	5540	- Investigate best controllable thrust rocket motor from competing gel and pintle-solid designs for Mod HF/AFSS ATG and GTG missions. - Investigate best Automatic Target Recognition (ATR) hardware and software which best meet ATG and GTG mission requirements for Mod HF/AFSS.
•	7708	- Perform flight test of FMTI full-up missile (Congressional plus-up).
•	498	- Small Business Innovation Research/Small Business Technology Transfer (SBIR/STTR) Program
Total	19822	

FY 2001 Planned Program:

•	4505	- Complete hardware design and begin fabrication of seekers. - Conduct bench and tower test of prototype seekers. - Begin preparations for seeker/missile flight test program.
•	1876	- Conduct controllable propulsion trade study for MHF/CM. - Conduct analysis of alternative propulsion systems. - Conduct analysis of fuel/oxidizer chemistry to enhance performance. - Complete controllable thrust motor development. - Conduct static test firings of controllable thrust motor. - Test ATR hardware/software. - Test guidance datalink.
•	6990	- Funds will be used in support of the New Army Vision/Transformation.
Total	13371	

ARMY RDT&E BUDGET ITEM JUSTIFICATION (R-2A Exhibit)

DATE: February 2000

BUDGET ACTIVITY: 3 - Advanced Technology Development

PE NUMBER AND TITLE: 0603313A Missile and Rocket Advanced Technology

PROJECT: D380

COST (*In Thousands*)	FY1999 Actual	FY 2000 Estimate	FY 2001 Estimate	FY 2002 Estimate	FY 2003 Estimate	FY2004 Estimate	FY2005 Estimate	Cost to Complete	Total Cost
D380 Multi-Platform Launcher	5588	4365	0	0	0	0	0	0	9953

Mission Description and Justification: The Multi-Platform Launcher (MPL) program explores and implements technologies to improve the deployability and lethality of the Multiple Launch Rocket System (MLRS) for counter battery, counter armor, and critical target missions. The first phase, designed, developed, and flight tested a low cost guidance and control system for the MLRS free-flight rocket, (Guided MLRS). The guidance system makes use of inertial and Global Positioning System (GPS) low cost component technologies. The improvements made to the Guided MLRS results in both a more lethal force and a reduced logistics burden, which is especially important for early entry. This phase completed in FY 98 and has transitioned to EMD. The second phase of the program supports the design and testing of the High Mobility Artillery Rocket System (HIMARS), a C-130 transportable MLRS launcher, in the RFPI ACTD. The HIMARS program will complete in FY 2000 and is currently in the final year of the RFPI ACTD extended user evaluation. The HIMARS program transitions to EMD in FY 2000. Work is performed by the Missile Research, Development, and Engineering Center, U.S. Army Aviation and Missile Command, Redstone Arsenal, AL. The major contractor is Lockheed Martin Vought Systems, Dallas, TX.

FY 1999 Accomplishments:

- 5588 - Provided maintenance, spares, replacements, and repairs for HIMARS residuals, to be evaluated by the user as a part of the Rapid Force Projection Initiative Advanced Concept Technology Demonstration (ACTD) extended user evaluation.
  - Provided improved hydraulic pump for increased reliability.
  - Provided government furnished equipment to contractor.
  - Provided support for interim HIMARS maintenance facility.
  - Implemented user recommended improvements.
  - Updated and improved rocket algorithm for increased accuracy.

Total 5588

FY 2000 Planned Program:

- 1837 - Complete support for residual HIMARS launchers as part of RFPI ACTD extended user evaluation.
- 2425 - MSTAR program is currently being terminated and the funding will be reprogrammed to higher priority Army programs.
- 103 - Small Business Innovation Research/Small Business Technology Transfer (SBIR/STTR) Program

Total 4365

FY 2001 Planned Program: Project not funded in FY 2001.

ARMY RDT&E BUDGET ITEM JUSTIFICATION (R-2A Exhibit)

DATE: February 2000

BUDGET ACTIVITY: 3 - Advanced Technology Development

PE NUMBER AND TITLE: 0603313A Missile and Rocket Advanced Technology

PROJECT: D486

COST (*In Thousands*)	FY1999 Actual	FY 2000 Estimate	FY 2001 Estimate	FY 2002 Estimate	FY 2003 Estimate	FY2004 Estimate	FY2005 Estimate	Cost to Complete	Total Cost
D486 Rapid Force Projection Simulation	4890	0	0	0	0	0	0	0	4890

Mission Description and Justification: The Rapid Force Projection Initiative (RFPI) Advanced Concept Technology Demonstration (ACTD) Simulation Support Plan and the RFPI Study Plan provided a detailed description of the simulation and analysis efforts used to support the RFPI program. These efforts completed in FY 1999. Scenario development, force-on-force modeling, and simulation were supported by detailed engineering models, preliminary system performance estimates/data, and other system models and simulations provided by the RFPI program and the individual Advanced Technology Demonstrations/ Technology Demonstrations (ATDs/TDs). All simulations and analyses were performed under the guidance and supervision of the Integrated Battlefield Simulation and Analysis Team (IBSAT). Simulations and analyses supported the determination of value-added proposed technologies for the RFPI ACTD and were utilized to determine the mix and number of developmental sensors used in the Advanced Warfighting Experiment (AWE) and subsequently determined the residual quantities and support requirements. Work was performed by the Missile Research, Development, and Engineering Center, U.S. Army Aviation and Missile Command, Redstone Arsenal, AL. Major contractors were Computer Science Corporation, Huntsville, AL, and Nichols Research Corporation, Huntsville, AL.

FY 1999 Accomplishments:

- 960 - Provided virtual simulation resources to support real/virtual experiments during the residual period.
- 1550 - Applied RFPI technologies to excursion scenarios to include urban, varying terrain, weather, and countermeasures.
  - Performed post ACTD model-experiment-model runs and analysis.
  - Performed excursion runs and analysis.
- 1670 - Provided support for manned simulator residual.
- 710 - Performed final operational effectiveness analysis.

Total 4890

FY 2000 Planned Program: Project not funded in FY 2000.

FY 2001 Planned Program: Project not funded in FY 2001.

ARMY RDT&E BUDGET ITEM JUSTIFICATION (R-2A Exhibit)	DATE February 2000
BUDGET ACTIVITY 3 - Advanced Technology Development	PE NUMBER AND TITLE 0603313A Missile and Rocket Advanced Technology PROJECT D493

COST (*In Thousands*)	FY1999 Actual	FY 2000 Estimate	FY 2001 Estimate	FY 2002 Estimate	FY 2003 Estimate	FY2004 Estimate	FY2005 Estimate	Cost to Complete	Total Cost
D493 Rapid Force Projection Demonstration	16168	16949	0	0	0	0	0	0	33117

Mission Description and Justification: The integrated system of systems concept of this Advanced Concept Technology Demonstration (ACTD) provided lightweight, responsive precision fires to destroy threat armor forces during day, night, and adverse weather. The ACTD evaluated the value added by the insertion of these new technologies into the force structure of an existing light unit in a lift constrained environment. The inserted systems consisted of forward sensors (hunters), advanced C2, and a suite of standoff killers. The mix of forward sensors used to complement and enhance existing unit assets included both manned and unmanned air and ground systems. The sensor architecture was based on the unit equipment, as documented in the U.S. Army Intelligence Master Plan and the U.S. Army Modernization Plan, and was augmented with other sensors and processors, as required, to ensure forward sensors are properly cued. Tactical sensors (organic and advanced) received cueing information from these sensors to rapidly focus them on targets. The ACTD included both simulation and field demonstration phases, and encouraged user exploration of excursions from the baseline Tactics, Techniques, and Procedures (TTPs) to optimize utility of the standoff killers, forward sensors, and advanced C2 for the light forces. The RFPI ACTD field experiment was completed in 4QFY98, followed by an extended user evaluation of residual quantities. Integrated demonstration work was performed by the Missile Research, Development, and Engineering Center, U.S. Army Aviation and Missile Command, Redstone Arsenal, AL. Major contractors are Nichols Research Corporation, Huntsville, AL; and Computer Sciences Corporation, Huntsville, AL.

FY 1999 Accomplishments:

- 4235 - Provided maintenance, replacement parts, and spares in direct support of user units.
  - Provided spare batteries, cables, and other replacement parts for communications equipment.
  - Provided RFPI integrated logistics support, personnel, analysis, and training.
- 8320 - Provided training on residual equipment for experiment units.
  - Provided residual support for hunter/killer systems/LDTOC.
  - Provided analysis of field experiment
- 3613 - Provided analysis and support including countermeasure/counter-countermeasure analysis.

Total 16168

FY 2000 Planned Program:

- 10897 - Provide support for residual RFPI elements including disposition of residual hardware.
  - Provide training on residual elements to user units.
  - Provide spares/replacement parts for residual elements.

ARMY RDT&E BUDGET ITEM JUSTIFICATION (R-2A Exhibit)	DATE February 2000
BUDGET ACTIVITY 3 - Advanced Technology Development	PE NUMBER AND TITLE 0603313A Missile and Rocket Advanced Technology
	PROJECT D493

FY 2000 Planned Program: (continued)

•	1862	- Provide analysis and support, including support for possible milestone reviews/transition to procurement.
		- Provide comprehensive ACTD final report.
•	3779	- Evaluate select RFPI residuals in Joint Contingency Force (JCF) Advanced Warfighting Experiment (AWE).
•	411	- Small Business Innovation Research/Small Business Technology Transfer (SBIR/STTR) Program
Total	16949	

FY 2001 Planned Program: Project not funded in FY 2001.

ARMY RDT&E BUDGET ITEM JUSTIFICATION (R-2A Exhibit)

DATE: February 2000

BUDGET ACTIVITY: 3 - Advanced Technology Development

PE NUMBER AND TITLE: 0603313A Missile and Rocket Advanced Technology

PROJECT: D496

COST (*In Thousands*)	FY1999 Actual	FY 2000 Estimate	FY 2001 Estimate	FY 2002 Estimate	FY 2003 Estimate	FY2004 Estimate	FY2005 Estimate	Cost to Complete	Total Cost
D496 Enhanced Fiber Optic Guided Missile (EFOG-M)	18630	0	0	0	0	0	0	0	18630

Mission Description and Justification: This program completed in FY 1999. The EFOGM system is a multi-purpose, precision kill weapon system. The primary mission of the EFOGM is to engage and defeat threat armored combat vehicles, other high value ground targets, and hovering or moving rotary wing aircraft that may be masked from line of sight direct fire weapon systems. EFOGM is a day/night, adverse weather capable system that allows the maneuver commander to extend the battle space beyond line of sight to ranges up to 15 kilometers, thus reducing the exposure of the gunner and allowing targets to be taken out of the battle early. The missile can navigate to the target area automatically, and the gunner can intervene at any time to lock on and engage any detected targets. This gunner in the loop capability enhances the target acquisition process and minimizes fratricide and collateral damage. The gunner views the flight path and target via a seeker on the missile linked to the gunner's video console. The missile incorporates an IR imaging seeker and a variety of advanced targeting functionalities.

FY 1999 Accomplishments:

- 12738 - Conducted 4 guided test vehicle developmental missile flight tests.
  - Conducted warhead test, impact fuze sensor/propulsion evaluation, production flight readiness test, fiber optic cable testing, fire unit burn-in road test, and live developmental missile flight tests.
  - Conducted captive flight testing, missile electromagnetic interference testing and Y2K certification.
  - Continued systems support for ACTD hardware for the XVIII Airborne Corps.
  - Evaluated tactics, techniques, and procedures and validate war fighting operations and firing doctrine.
- 1093 - Performed test planning, test facility/range operations, test data reduction, and provided targets and target support for simulated missile flights, developmental missile flight tests, and environmental, safety, transportability, and lethality testing.
- 2248 - Provided integrated product team support from a wide variety of functional areas.
  - Provided facilities and support to development process, including hardware-in-the-loop, hardware/software integration and verification of system capabilities.
- 2551 - Programmatic and technical integrated product team support for engineering design, developmental test planning and conduct, cost and schedule control, affordability and producibility analyses, and risk management and mitigation efforts.

Total 18630

FY 2000 Planned Program: Project not funded in FY 2000.

FY 2001 Planned Program: Project not funded in FY 2001.

ARMY RDT&E BUDGET ITEM JUSTIFICATION (R-2A Exhibit)	DATE February 2000
BUDGET ACTIVITY 3 - Advanced Technology Development	PE NUMBER AND TITLE 0603313A Missile and Rocket Advanced Technology PROJECT D549

COST *(In Thousands)*	FY1999 Actual	FY 2000 Estimate	FY 2001 Estimate	FY 2002 Estimate	FY 2003 Estimate	FY2004 Estimate	FY2005 Estimate	Cost to Complete	Total Cost
D549 2.75 Inch Anti-Air Technology Demonstration (TD)	2590	0	0	0	0	0	0	0	2590

Mission Description and Justification: The objective of this project is to demonstrate the technology for a comprehensive upgrade to the STINGER missile system through the incorporation of an advanced imaging IR (IR) seeker to enable the engagement of hostile helicopters in clutter at extended ranges (2-3x). This project will demonstrate the ability to package the previously developed commercial breadboard signal processing electronics in a 2.75 inch diameter seeker. In addition, signal processing algorithms for target detection, tracking, and IR counter-countermeasures (IRCCM) will be developed and demonstrated via hardware in the loop simulations, ground tests, and captive carry tests. This seeker will maintain compatibility with existing STINGER launchers and retain STINGER's excellent capability against fixed wing aircraft. This program completed in FY 99. Work is performed by the Missile Research, Development, and Engineering Center, U.S. Army Aviation and Missile Command, Redstone Arsenal, AL.

FY 1999 Accomplishments:

- 1490 - Completed endgame and IRCCM signal processing algorithms.
  - Completed HWIL simulation.
  - Performed HWIL missile flight simulations.
- 1100 - Developed platform/launcher interfaces.
  - Performed captive carry air-to-air tests.
  - Performed environmental tests.

Total 2590

FY 2000 Planned Program: Project not funded in FY 2000.

FY 2001 Planned Program: Project not funded in FY 2001.

ARMY RDT&E BUDGET ITEM JUSTIFICATION (R-2A Exhibit)	DATE February 2000
BUDGET ACTIVITY 3 - Advanced Technology Development	PE NUMBER AND TITLE 0603313A Missile and Rocket Advanced Technology PROJECT D550

COST (*In Thousands*)	FY1999 Actual	FY 2000 Estimate	FY 2001 Estimate	FY 2002 Estimate	FY 2003 Estimate	FY2004 Estimate	FY2005 Estimate	Cost to Complete	Total Cost
D550 Counter Active Protection System	2134	1990	5466	5461	2481	0	0	0	17532

Mission Description and Justification: This project will develop and demonstrate technologies which can be applied to Anti Tank Guided Weapons (ATGW) for improving their effectiveness against threat armor equipped with active protection systems (APS). Current technology development is concentrated in the following areas: radio frequency (RF) countermeasure (RFCM) technology for jamming or deceiving APS sensors used for detection, acquisition, and tracking; warhead integration and ballistic hardening of ATGW to reduce vulnerability to fragment impact. Work is performed by the Missile Research, Development, and Engineering Center, U.S. Army Aviation and Missile Command, Redstone Arsenal, AL.

FY 1999 Accomplishments:

- 2134 - Completed 2nd generation test bed APS radar.
  - Fabricated, integrated, and tested 2nd generation RF countermeasure flight prototypes.

Total 2134

FY 2000 Planned Program:

- 1936 - Complete 1st iteration monolithic microwave integrated circuit (MMIC) component development for 3rd generation RF countermeasure.
  - Begin development of brassboard activity detector, 1st iteration antennas, and brassboard base band module.
- 54 - Small Business Innovation Research/Small Business Technology Transfer (SBIR/STTR) Program

Total 1990

FY 2001 Planned Program:

- 5466 - Complete brassboards of 3rd generation RF countermeasures demonstrate functionality using 1st iteration MMICs
  - Complete 2nd iteration MMIC component development
  - Begin design and fabrication of 3rd generation RF test bed
  - Begin integration to missile test bed airframes

Total 5466

ARMY RDT&E BUDGET ITEM JUSTIFICATION (R-2A Exhibit)

DATE: February 2000

BUDGET ACTIVITY: 3 - Advanced Technology Development

PE NUMBER AND TITLE: 0603313A Missile and Rocket Advanced Technology

PROJECT: D567

COST *(In Thousands)*	FY1999 Actual	FY 2000 Estimate	FY 2001 Estimate	FY 2002 Estimate	FY 2003 Estimate	FY2004 Estimate	FY2005 Estimate	Cost to Complete	Total Cost
D567 Low Cost Precision Kill (LCPK) for 2.75 Inch Rockets	0	5307	3828	0	0	0	0	0	9135

Mission Description and Justification: This project provides for demonstration of a low cost, accurate (1-m CEP) guidance and control package for the 2.75-inch Hydra-70 rocket that provides a stand-off range ($\geq$ 6 km) capability against specified non-tank point targets. The retrofit guidance package will allow utilization of large existing Hydra 70 rocket motor, warhead, and fuze inventories. This capability will provide for a high single shot probability of hit (pH$\geq$ 0.7) against the long range target, exceeding the current unguided 2.75-inch rocket baseline by 1 or 2 orders of magnitude and thereby providing a 4 to 1 increase in stowed kills at one third the cost per kill compared to current guided missiles. The resulting decrease in logistics burden is of significant benefit to a CONUS-based force projection Army and of particular importance in a rapid force projection scenario. In addition, the increased accuracy will minimize collateral damage, reduce risk of fratricide, and will reduce mission times and sorties resulting in increased system survivability. The program will demonstrate technologies and techniques to overcome barriers such as providing a low cost, producible strapdown mechanism for precision guidance; robust design for rolling airframe applications; component packaging in 2.75 - inch airframe; structural, vibration and shock considerations for guidance package retro-fit to current 2.75 - inch Hydra-70 rockets; and stand-off range target acquisition and engagement techniques to address current free-rocket launch and flight dispersions. Work will be performed by the Research, Development, and Engineering Center, U. S. Army Aviation and Missile Command, Redstone Arsenal, Al.

FY 1999 Accomplishments: Project not funded in FY 1999.

FY 2000 Planned Program:

- 2955 - Award contract(s) for design and fabrication of laser guidance package(s) and associated flight test support.
- 1739 - Perform risk reduction captive test vehicle flight tests.
- 485 - Develop 6 degrees of freedom (DOF) simulation Monte-Carlo performance prediction simulations. Validate with hardware-in-the-loop (HWIL) tests of prototype guidance section(s).
- 128 - Small Business Innovation Research/Small Business Technology Transfer (SBIR/STTR) Program

Total 5307

ARMY RDT&E BUDGET ITEM JUSTIFICATION (R-2A Exhibit)	DATE February 2000
BUDGET ACTIVITY 3 - Advanced Technology Development	PE NUMBER AND TITLE 0603313A Missile and Rocket Advanced Technology
	PROJECT D567

FY 2001 Planned Program:

•	3500	- Perform HWIL evaluations of contractor guidance section. - Perform ground launched guided test vehicle flights of contractor guidance sections.
•	328	- Upgrade and validate 6-DOF simulation(s). - Support pre/post flight predictions/analysis.
Total	3828	